

## Breakout: Advanced Users' Level Network-Aware Services

### Agenda and Questions

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#### Day 1: Breakout Session 1:

- Welcome and session logistics – Dantong Yu and Phil DeMar
- **Case study presentation:** Findings from ESnet Requirements Workshop, Eli Dart
- Discussions on Question 1 and 2
- Summary of discussions - scribe

#### Day 1: Breakout session 2:

- Welcome and session logistics - Dantong Yu and Phil DeMar
- **Case study presentation:** Open Science Grid - Network-aware Grid applications Test Case - Author Ruth Pordes, and Presenter: Phil Demar/Dantong Yu on the original author's behalf.
- **Case study presentation:** Earth Science Grid – Grid Enabled Network-aware application Test Case –Dean William.
- Discussions on Question 2 and 3:
- Summary of discussions - scribe

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#### Day 2: Breakout Session 1

- Welcome and session logistics - Dantong Yu and Phil DeMar
- **Case study presentation**– Automatic Performance Diagnosis System in Federated Environment. –Phil Demar.
- Discussions on questions 3 and 4:
- Summary of discussions - scribe

#### Day 2: Breakout Session 2:

- Welcome and session logistics - Dantong Yu and Phil DeMar
  - **Opening presentation** –Data Transfer Environment with Science Application Perspective – Ian Foster
  - Discussions on questions 4 and 5:
  - Summary of discussions - scribe
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## Session 1: Advanced User's Level Network-Aware Services

### Context:

- Target users and applications: scientists, network-aware application developers, other end users, and DOE data intensive science applications.
- Network capabilities and complexities should be transparent to scientists and science applications.
- Scientists' experience with using these network services should enhance with automations of services and workflows.
- Scientists should be able to predict, observe, and monitor the state and health of the network with ease and in real-time if necessary.
- Ease-of use and accessibility by scientists and science applications.

### 1. **Question 1: Network users and applications' experience at extreme scale -**

What will be the fundamental challenges in developing advanced users services to facilitate ease-of-use for scientists using end-to-end terabits networks?

- a) Performance gap between application level capacity and the bare metal network raw bandwidth
- b) Network protocols are designed for previous internet which is significant different from today's high performance network
- c) Bottlenecks in entities within the end-to-end paradigm
- d) Heterogeneity of applications and networks

### 2. **Question 2: Exposing network capabilities, resources, and security policies to end users** – Scientists are typically unaware of network capabilities, available bandwidth, network limitations, expected performance, etc. What are the challenges of developing advanced services and tools to provide users and science applications with the above capabilities

- a) Resource discovery
- b) Users' level network and related resources scheduling and reservation.
- c) Reachability maps
- d) others

### 3. **Question 3: Enhancing network users' experience with network performance weather services** – Users and science applications should be able to discover, monitor, predict, and test the performance of end to end terabits. These capabilities enable scientists and their applications to use network resources effectively and efficiently. What are the challenges of scaling existing tools and services that offer these capabilities in terascale?

- a) Users' level and application level network performance monitoring capabilities.
- b) Real-time performance tracking
- c) User's level automated fault diagnostic capabilities.
- d) Others

4. **Question 4: Automated and intelligent workflow** – Using the network efficiently involves discovering the network available bandwidth, network capabilities, inter-domain policies, data resources, etc., and coordinating their usage. What are the challenges of assisting users to carry out this critical task effectively? Issues for considerations:

- a) Data transfer Intelligent workflows
- b) Resources discovery and co-scheduling in federated network environment
- c) Others

5. **Question 5: Community-based advanced services through network virtualization** – DOE's scientists typically collaborate and work large groups (Climate -ESG, HEP-OSG, etc.) to undertake complex science effort. What are the challenges in developing and deploying and managing automated community-based advanced services? What is the role network virtualization in this effort? Issues for considerations:

- a) Community-based network services
- b) Users and applications' level network virtualization services
- c) Community-based access control credential management
- d) Others

6. **Other Questions**